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(54) **Color image communication**

Farbbildübertragung

Communication d'images au couleurs

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Description

[0001] This invention relates to an apparatus and a method for processing and transmitting color image data.

[0002] Ordinarily, a color image is copied in such a manner that a color original is first read with an optical scanner, the read image data is stored and is thereafter processed for shading correction, color correction, color conversion, density correction, black signal generation and so on before it is output to a printer or the like.

[0003] In a case where input image data is output to a monitor or the like, certain kinds of processing, e.g., black signal generation and density correction among those mentioned above are not necessary.

[0004] Thus, according to the kind of apparatus to which read color image data is output, the content of necessary image processing varies. A need for some inverse conversion processing therefore arises, for example, in a case where image data transmitted in a form such as to be output to a printer is output to a monitor.

[0005] However, kinds of image processing performed for conventional color scanners, color printers, color copiers, image processors and so on are based on respective specific systems. Even if output prepared by image processing with an apparatus is inversely processed with another apparatus, the image cannot be restored correctly. For example, in a case where data is received after the data has been processed to be output to a printer, it is very difficult to output this data to a monitor or the like while ensuring correct color reproduction of the original.

[0006] EP-A-0355838 describes a visual telephone apparatus which is capable of facsimile communication by deciding whether a communication specification or protocol for telephone or facsimile communication should be used to enable data communication with a receiving terminal.

[0007] EP-A-0451722 describes an image transmission device which is capable of transmitting an image in any one of a plurality of different resolutions and in which density conversion processing is performed in accordance with the selected transmission resolution.

[0008] According to one aspect of the present invention, there is provided a colour image communication apparatus comprising: a) processing means for processing colour image data representative of a colour image to be transmitted to a receiving terminal; and b) transmitting means for transmitting the processed colour image data to the receiving terminal; characterized in that said processing means comprises: i) colour correction/ colour conversion processing means for performing colour correction/colour conversion processing of the colour image data for a current colour image to be transmitted; and ii) black generating/density conversion means for generating black colour data and for performing density conversion of the colour image data having been subjected to said colour correction/conversion processing for the current image to be transmitted; and in that the apparatus further comprises: c) discriminating means for discriminating information relating to said colour image processing in response to a signal received from the receiving terminal after transmission of a session start command by the colour image communication apparatus according to a protocol between the receiving terminal and the colour image communication apparatus; and d) controlling means for controlling whether or not the black generating/density conversion means generates black colour data and performs density conversion in response to the discrimination performed by said discriminating means.

[0009] A corresponding method is also provided.

[0010] The present invention has the advantage of reducing the amount of processing which the receiving terminal must perform to be able to regenerate the colour image. This is achieved by configuring the transmitting terminal in accordance with the characteristics of the receiving terminal, which are made known to the transmitting terminal by a signal sent from the receiving terminal.

[0011] An embodiment of the present invention provides a color image transmission apparatus designed to be suitable for performing color image processing in accordance with characteristics of a transmission destination terminal.

[0012] An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of the constructions of hardware of an image transmission apparatus in accordance with an embodiment of the present invention;
Fig. 2 is a schematic diagram of a communication protocol sequence;
Fig. 3 is a schematic diagram of examples of non-standard function parameters;
Figs. 4A and 4B are flow charts of a control sequence for image transmission processing; and
Fig. 5 is a diagram of a circuit with which processing selection using a control signal is realized.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Fig. 1 is a block diagram of the hardware construction of an image transmission apparatus in accordance with an embodiment of the present invention. A CPU (central processing unit) 1 controls the overall operation of the image transmission apparatus of this embodiment in accordance with a program stored in a ROM 2. An image to be processed for transmission is read with a color scanner 3. The scanner 3 is controlled by a controller 4 based on instructions from the CPU 1. The read image is stored in a RAM 5 and image

processing, modulation/demodulation processing, communication processing and other kinds of processing are effected through the RAM 5. A part of the area of the RAM 5 is used for temporary storage of data processed by the CPU 1. An image processing unit 6 effects several kinds of processing of read image data and includes a color conversion/color correction unit 6-1, a black signal generation part (also effecting under color reduction (UCR)) 6-2, a density conversion unit 6-3, and a binarizing multi-value processing unit 6-4. The density conversion unit 6-3 comprises a gamma conversion circuit which effects gamma conversion of input data by using a look-up table or the like. When an image read with the scanner is displayed on a CRT 7, data obtained by processing the input image by color conversion and correction is input to a video signal generation unit 8. An HD controller 9 controls the operation of storing image data in a hard disk 10 by an instruction from the CPU 1. Data to be stored in the hard disk 10 has been color-modulated by a modulator-demodulator 11 (i.e., processed by multi-value color compression such as ADCT or by two-value color compression) and can directly be transmitted from a communication control unit 12 to the line. Data received from the line is stored in the hard disk 10, is demodulated by the modulator-demodulator 11 and thereafter undergoes multi-valuing processing, black signal generation processing and density conversion processing to be output through a printer 13. A printer controller 14 controls the printer operation by being instructed by the CPU 1 while establishing synchronization with the operation of the image processing unit. Through an operation panel 15, the operator inputs a transmission instruction, a received document output instruction and other instructions. Control signals are exchanged between the above-described processing units through a system bus 16. Image data is exchanged between the processing units through an image bus 17.

[0014] Fig. 2 is a schematic diagram of a communication protocol sequence conducted by the communication control unit 12. The communication control unit 12 receives an instruction from the CPU to perform communication processing in accordance with this sequence. This protocol sequence is described with respect to only processing above the session layer. To start communication, a transmitting terminal sends out a session start command (CSS: P1). A receiving terminal receives CSS and sends out a session affirmation response (RSSP: P2) if it determines that communication can be started. When the transmitting terminal detects incoming of RSSP, session is started. Next, a document function list command (CDCL: P3) is issued to perform a negotiation with respect to non-basic function characteristics. In this embodiment, negotiation in a transmitted image processing state is performed with non-standard function parameters of this CDCL and a document function list affirmation response (RDCLP: P4) described below. Fig. 3 shows examples of the non-standard function parameters (NSC parameters). NSC parameters are described with respect to both CDCL and RDCLP. That is, the contents of CDCL and RDCLP are compared, and the transmitting communication apparatus controls image processing based on the result of this comparison. A Japanese code, a domestic code and a supplier code subsequent to an NSC discrimination element are codes determined in accordance with a notification of Ministry of Posts and Telecommunications. Data can freely be described as codes subsequent to these codes by a maker which is a supplier. In the case of the set of codes shown in Fig. 3, a code indicating an apparatus type is written after a class code indicating that the kind of communication apparatus is a facsimile apparatus, thereby enabling discrimination as to whether or not the apparatus has functions exemplified in this embodiment. Subsequently to the type code, a protocol function description element is written. This element indicates a protocol function with respect to document conversion performed in this session. In the example shown in Fig. 3, image processing state request/instruction are effected in this data field.

[0015] Image processing state negotiation is performed by using these NSC parameters. After the completion of negotiation, the transmitting terminal sends out a document start command (CDS: P5) and then effects document transfer P6 in image data transmission phase. The image data transmitted by this document transfer previously undergoes image processing in accordance with the agreement made by using the above NSCs. After the image data has entirely been transmitted, the transmitting terminal sends out a document end command (CDE: P7). The receiving terminal receives the CDE and sends out a document end confirmation response (RDEP: P8) if it determines that the reception can be terminated. The transmitting terminal receives the RDEP and sends out a session end command (CSE: P9) if it determines that release from the session is allowed. The transmitting terminal detects incoming of the session end response (RSEP: P10) from the receiving terminal to terminate all the transmission processings at the session level.

[0016] Fig. 4 is a flow chart showing a control sequence for image transmission processing. To start transmission processing, determination is made in step S1 as to whether or not there is a need for transmission operation. In step S2, if there is a transmission request, the CPU 1 instructs the communication control unit 12 to start the session. The communication control unit 12 then sends out CSS (P1). In step S3, a response from the apparatus at the other end of the line is awaited. When the communication control unit detects incoming of RSSP (P2), it informs the CPU of this detection, and the process then proceeds to step S4 in which the communication control unit is instructed to send out CDCL. At this time, processing is performed so that NSCs are set as parameters of CDCL. When the communication

control unit receives RDCLP (P4) from the other-end terminal after it has sent out P3 CDCL by the instruction in step S4, it informs the CPU in the RDCLP incoming waiting state in step S5 of this incoming. In step S6, the CPU analyzes NSC parameters in RDCLP, and stores the request from the other-end terminal with respect to the image processing state. By the above sequence, the negotiation phase is terminated. CDS sending instruction is then effected in step S7, and the process proceeds into the image data transmission phase. In step S8, the CPU instructs the scanner controller 4 to start scanning an original. When the scanner 3 starts inputting image data by receiving this instruction, the image data is stored in the RAM 5 in step S9. In step S10, the image data in the RAM 5 is processed by the image processing unit 6 for color conversion and color correction, and the process proceeds to step S11. In step S11, a flow is selected with respect to whether or not the image data is processed for black signal generation and density conversion according to the result of negotiation of the image processing state which result is stored in step S6. More specifically, codes designating black signal generation/density conversion processing as shown in Fig. 3 are discriminated. If this processing is performed, the process proceeds to step S12. If this processing is not performed, the process proceeds to step S13 by skipping step S12. Fig. 5 is a circuit diagram of an example of hardware with which the CPU effects processing selection in S11 by using control signals A and B.

[0017] When the control signal A is on, no image signal is output through an AND gate in front of the colour correction/colour conversion circuit 6-1 while the input image signal is directly output through a gate below. Conversely, when the control signal A is off, the image signal flows through the upper AND gate and is processed in the colour correction/colour conversion circuit to be output to the next circuit. The control signal B has the same effect; when the control signal B is on, the image signal is output without flowing through the black generating/density conversion circuit 6-2, 6-3; and, when the control signal is off, the image signal flows through the upper AND gate and is output from the black generating/density conversion circuit. The processing of this embodiment is realized by providing in the image processing unit 6 a circuit such as that shown in Fig. 5 and such that the status of each control signal A or B can be set by an instruction from the CPU. The black signal generation circuit 6-2 and the density conversion circuit 6-3 shown in Fig. 5 correspond respectively to the units 6-2 and 6-3 shown in Fig. 1. In step S12, the image data is supplied to both these two processing units. In step S13, the image data processed by these kinds of processing is color-modulated by the modulator-demodulator 11. In step S14, the communication control unit 12 is instructed to send out the modulated data to the line. This operation corresponds to P6 of the protocol sequence. Next, in step S15, determination is made as to whether or not there is any remaining portion of the original to be scanned. If a portion to be scanned is left, the processing of steps S8 to S14 is repeated. If no portion to be scanned, the process proceeds to step S16. In step S16, the CPU sends a document end command to the communication control unit. The communication control unit sends out CDE (P7) and, at the time of incoming of RDEP (P8) from the other-end terminal, in step S17, informs the CPU in the RDEP waiting state of this incoming. The CPU then issues a CSE (P9) sending instruction in step S18, and waits for information from the communication control unit of detection of incoming of RSEP (P10). When the CPU is informed of incoming of RSEP, it terminates the transmission processing.

[0018] In this embodiment, negotiation of the image processing state is performed with NSC parameters of CDCL and RDCLP. However, it is possible to perform negotiation by using user information in the case of a different protocol data unit, e.g., ISDN.

[0019] According to the embodiment described above, suitable color image processing in accordance with the characteristics of the receiving terminal can be selected automatically on the transmitting side, thus achieving an improvement in handling.

[0020] In the above-described flow chart shown in Fig. 4, scanning of the original is started in S8 subsequent to the document start command sending instruction in S7, but this is not exclusive. The process may alternatively be such that the original is previously scanned to accumulate image data, that is, the flow of steps S8 and S9 is previously executed, and thereafter the session start commanding and subsequent operations are effected.

Claims

1. A colour image communication apparatus comprising:

a) processing means (6-1, 6-2, 6-3) for processing colour image data representative of a colour image to be transmitted to a receiving terminal; and

b) transmitting means (12) for transmitting the processed colour image data to the receiving terminal;

characterized in that said processing means comprises:

i) colour correction/colour conversion processing means (6-1) for performing colour correction/colour conversion processing of the colour image data for a current colour image to be transmitted; and

ii) black generating/density conversion means (6-2, 6-3) for generating black colour data (K) and for performing density conversion of the colour image data having

been subjected to said colour correction/conversion processing for the current image to be transmitted; and in that the apparatus further comprises:

c) discriminating means (1) for discriminating information relating to said colour image processing in response to a signal received from the receiving terminal after transmission of a session start command (CSS) by the colour image communication apparatus according to a protocol between the receiving terminal and the colour image communication apparatus; and

d) controlling means (1) for controlling whether or not the black generating/density conversion means (6-2, 6-3) generates black colour data (K) and performs density conversion in response to the discrimination performed by said discriminating means (1).

2. A colour image communication apparatus according to claim 1, further comprising input means (3) for inputting the colour image data.

3. A colour image communication apparatus according to claim 2, wherein said input means includes a colour scanner (3).

4. A colour image communication apparatus according to claim 1, 2 or 3, further comprising encoding means (11) for encoding the processed colour image data prior to transmission by said transmitting means (12).

5. A colour image communication apparatus according to any preceding claim, wherein said black generating/density conversion means includes a gamma conversion circuit.

6. An apparatus according to any preceding claim, wherein said receiving terminal includes a display circuit.

7. A colour image communication method for transmitting colour image data, representing a colour image from a colour image communication apparatus to a receiving terminal, the method comprising the steps of:

a) processing colour image data representative of a colour image to be transmitted to a receiving terminal;

b) transmitting the processed colour image data to the receiving terminal;

characterized in that said processing step comprises

i) the step of performing colour correction/colour conversion processing of the colour image data for a current colour image to be transmitted; and

ii) the further step of generating black colour data (K) and of performing density conversion of the colour image data having been subjected to said colour correction/conversion processing for the current image to be transmitted and in that the method further comprises the steps of

c) discriminating information relating to said colour image processing in response to a signal received from the receiving terminal after transmission of a session start command (CSS) by the colour image communication apparatus according to a protocol between the receiving terminal and the colour image communication apparatus; and

d) controlling whether or not black colour data (K) is generated and density conversion is performed on the colour image data having been subjected to colour correction/colour conversion processing for the current colour image to be transmitted, in response to the discrimination made in said discriminating step.

8. A method according to claim 7, further comprising the step of encoding the colour image data prior to transmission to said receiving terminal.

9. A method according to claim 7 or 8, wherein said black generation/density conversion step includes a gamma conversion step.

Patentansprüche

1. Farbbildübertragungsvorrichtung mit

a) einer Verarbeitungseinrichtung (**6-1**, **6-2**, **6-3**) zur Verarbeitung von Farbbilddaten, die ein zu einem Empfangsendgerät zu sendendes Farbbild darstellen, und

b) einer Sendeeinrichtung (**12**) zum Senden der verarbeiteten Farbbilddaten zu dem Empfangsendgerät,

dadurch gekennzeichnet, daß

die Verarbeitungseinrichtung

i) eine Farbkorrektur/Farbumwandlungsverarbeitungseinrichtung (**6-1**) zur Durchführung einer Farbkorrektur-/Farbumwandlungsverarbeitung der Farbbilddaten für ein gegenwärtiges, zu sendendes Farbbild, und

ii) eine Schwarzerzeugungs-/Dichte-Umwandlungseinrichtung (**6-2**, **6-3**) zur

Erzeugung von Schwarzfarbdaten (**K**) und zur Durchführung einer Dichte-Umwandlung der Farbbilddaten aufweist, die für das gegenwärtige, zu sendende Farbbild der Farbkorrektur-/Umwandlungsverarbeitung unterzogen worden sind, und
daß die Vorrichtung außerdem aufweist:

c) eine Unterscheidungseinrichtung (**1**) zur Unterscheidung von Informationen bezüglich der Farbbildverarbeitung im Ansprechen auf einem aus dem Empfangsendgerät empfangenes Signal nach dem Senden einer Sitzungsstartanweisung (**CSS**) seitens der Farbbildübertragungsvorrichtung gemäß einem Protokoll zwischen dem Empfangsendgerät und der Farbbildübertragungsvorrichtung, und
d) eine Steuerungseinrichtung (**1**) zur Steuerung, ob die Schwarzerzeugungs-/Dichte-Umwandlungseinrichtung (**6-2**, **6-3**) Schwarzfarbdaten (**K**) erzeugt und eine Dichte-Umwandlung durchführt oder nicht, im Ansprechen auf die durch die Unterscheidungseinrichtung (**1**) durchgeführte Unterscheidung.

2. Farbbildübertragungsvorrichtung nach Anspruch 1, mit einer Eingabeeinrichtung (**3**) zur Eingabe der Farbbilddaten.

3. Farbbildübertragungsvorrichtung nach Anspruch 2, wobei die Eingabeeinrichtung eine Farbabtasteinrichtung (**3**) aufweist.

4. Farbbildübertragungsvorrichtung nach Anspruch 1, 2 oder 3, mit einer Kodiereinrichtung (**11**) zum Kodieren der verarbeiteten Farbbilddaten vor Senden durch die Sendeeinrichtung (**12**).

5. Farbbildübertragungsvorrichtung nach einem der vorangehenden Ansprüche, wobei die Schwarzerzeugungs-/Dichte-Umwandlungseinrichtung eine Gamma-Umwandlungsschaltung aufweist

6. Vorrichtung nach einem der vorangehenden Ansprüche, wobei das Empfangsendgerät eine Anzeigeschaltung aufweist.

7. Farbbildübertragungsverfahren zum Senden von Farbbilddaten, die ein von einer Farbbildübertragungsvorrichtung zu einem Empfangsendgerät zu übertragendes Farbbild darstellen, mit den Schritten:

a) Verarbeiten von Farbbilddaten, die ein zu dem Empfangsendgerät zu sendendes Farbbild darstellen,
b) Senden der verarbeiteten Farbbilddaten zu dem Empfangsendgerät,
dadurch gekennzeichnet, daβ
der Verarbeitungsschritt

i) einen Schritt zur Durchführung einer Farbkorrektur-/Farbumwandlungsverarbeitung der Farbbilddaten für ein gegenwärtiges, zu sendendes Farbbild, und
ii) einen weiteren Schritt zur Erzeugung von Schwarzfarbdaten (**K**) und zur Durchführung einer Dichte-Umwandlung der Farbbilddaten aufweist, die für das gegenwärtige, zu sendende Farbbild der Farbkorrektur-/Umwandlungsverarbeitung unterzogen worden sind, und
daß das Verfahren außerdem die Schritte aufweist:

c) Unterscheiden von Informationen bezüglich der Farbbildverarbeitung im Ansprechen auf einem aus dem Empfangsendgerät empfangenes Signal nach dem Senden einer Sitzungsstartanweisung (**CSS**) seitens der Farbbildübertragungsvorrichtung gemäß einem Protokoll zwischen dem Empfangsendgerät und der Farbildübertragungsvorrichtung, und
d) Steuern, ob Schwarzfarbdaten (**K**) erzeugt werden und eine Dichte-Umwandlung an den Farbbilddaten, die einer Farbbildkorrekur-/Farbumwandlungsverarbeitung für das gegenwärtige, zu sendende Farbbild unterzogen worden sind, durchgeführt wird oder nicht, im Ansprechen auf die in dem Unterscheidungsschritt durchgeführte Unterscheidung.

8. Verfahren nach Anspruch 7, mit dem Schritt Kodieren der Farbbilddaten vor Senden zu dem Empfangsendgerät.

9. Verfahren nach Anspruch 7 oder 8, wobei der Schwarzerzeugungs-/Dichte-Umwandlungsschritt einen Gamma-Umwandlungsschritt aufweist.

Revendications

1. Appareil de transmission d'images en couleurs comportant :

a) des moyens de traitement (6-1, 6-2, 6-3) destinés à traiter des données d'images en couleurs représentatives d'une image en couleurs devant être transmise à un terminal de réception ; et
b) des moyens d'émission (12) destinés à transmettre les données d'images en couleurs traitées au terminal de réception ;
caractérisé en ce que lesdits moyens de traite-

ment comportent :

i) des moyens (6-1) de traitement de correction de couleur/conversion de couleur destinés à effectuer un traitement de correction de couleur/conversion de couleur des données d'images en couleurs pour une image en couleur alors présente devant être transmise ; et
ii) des moyens (6-2, 6-3) de génération de noir/conversion de densité destinés à générer des données de couleur noire (K) et à effectuer une conversion de densité des données d'images en couleurs ayant été soumises audit traitement de correction de couleur/conversion pour l'image alors présente devant être transmise ; et en ce que l'appareil comporte en outre :

c) des moyens de discrimination (1) destinés à discriminer une information concernant ledit traitement d'images en couleurs en réponse à un signal reçu du terminal de réception après l'émission d'un ordre de début de session par l'appareil de transmission d'images en couleurs conformément à un protocole entre le terminal de réception et l'appareil de transmission d'images en couleurs ; et
d) des moyens de commande (1) destinés à commander si des moyens (6-2, 6-3) de génération de noir/conversion de densité génèrent ou non des données de couleur noire (K) et effectuent ou non une conversion de densité en réponse la discrimination réalisée par lesdits moyens (1) de discrimination (1).

2. Appareil de transmission d'images en couleurs selon la revendication 1, comportant en outre des moyens d'entrée (3) pour l'entrée de données d'images en couleur.

3. Appareil de transmission d'images en couleurs selon la revendication 2, dans lequel lesdits moyens d'entrée comprennent un analyseur (3) de couleurs.

4. Appareil de transmission d'images en couleurs selon la revendication 1, 2 ou 3, comportant en outre des moyens de codage (11) destinés à coder les données d'images en couleurs traitées avant l'émission par lesdits moyens d'émission (12).

5. Appareil de transmission d'images en couleurs selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens de génération de noir/conversion de densité comprennent un circuit de conversion de gamma.

6. Appareil selon l'une quelconque des revendications précédentes, dans lequel ledit terminal de réception comprend un circuit d'affichage.

7. Procédé de transmission d'images en couleurs pour l'émission de données d'images en couleurs, représentant une image en couleurs, depuis un appareil de transmission d'images en couleurs jusqu'à un terminal de réception, le procédé comprenant les étapes dans lesquelles :

a) on traite des données d'images en couleurs représentatives d'une image en couleurs devant être transmises à un terminal de réception ;
b) on transmet les données d'images en couleurs traitées au terminal de réception ;
caractérisé en ce que ladite étape de traitement comprend

i) l'étape d'exécution d'un traitement de correction de couleurs/conversion de couleurs de données d'images en couleurs pour une image en couleur alors présente devant être transmise ; et
ii) l'autre étape consistant à générer des données de couleur noire (K) et à effectuer une conversion de densité des données d'images en couleurs ayant été soumises audit traitement de correction de couleurs/conversion pour l'image alors présente devant être transmise, et en ce que le procédé comprend en outre les étapes dans lesquelles

c) on discrimine une information concernant ledit traitement d'image en couleurs en réponse à un signal reçu du terminal de réception après la transmission d'un ordre de début de session par l'appareil de transmission d'images en couleurs conformément à un protocole entre le terminal de réception et l'appareil de transmission d'images en couleurs ; et
d) on détermine par une commande si des données de couleur noire (K) sont ou non générées et si une conversion de densité est exécutée ou non sur les données d'images en couleurs ayant été soumises à un traitement de correction de couleur/conversion de couleur pour l'image en couleur alors présente devant être transmise, en réponse à la discrimination réalisée dans ladite étape de discrimination.

8. Procédé selon la revendication 7, comprenant en outre l'étape de codage des donnés d'images en couleurs avant la transmission audit terminal de réception.

9. Procédé selon la revendication 7 ou 8, dans lequel ladite étape de génération de noir/conversion de densité comprend une étape de conversion de gamma.

FIG. 1

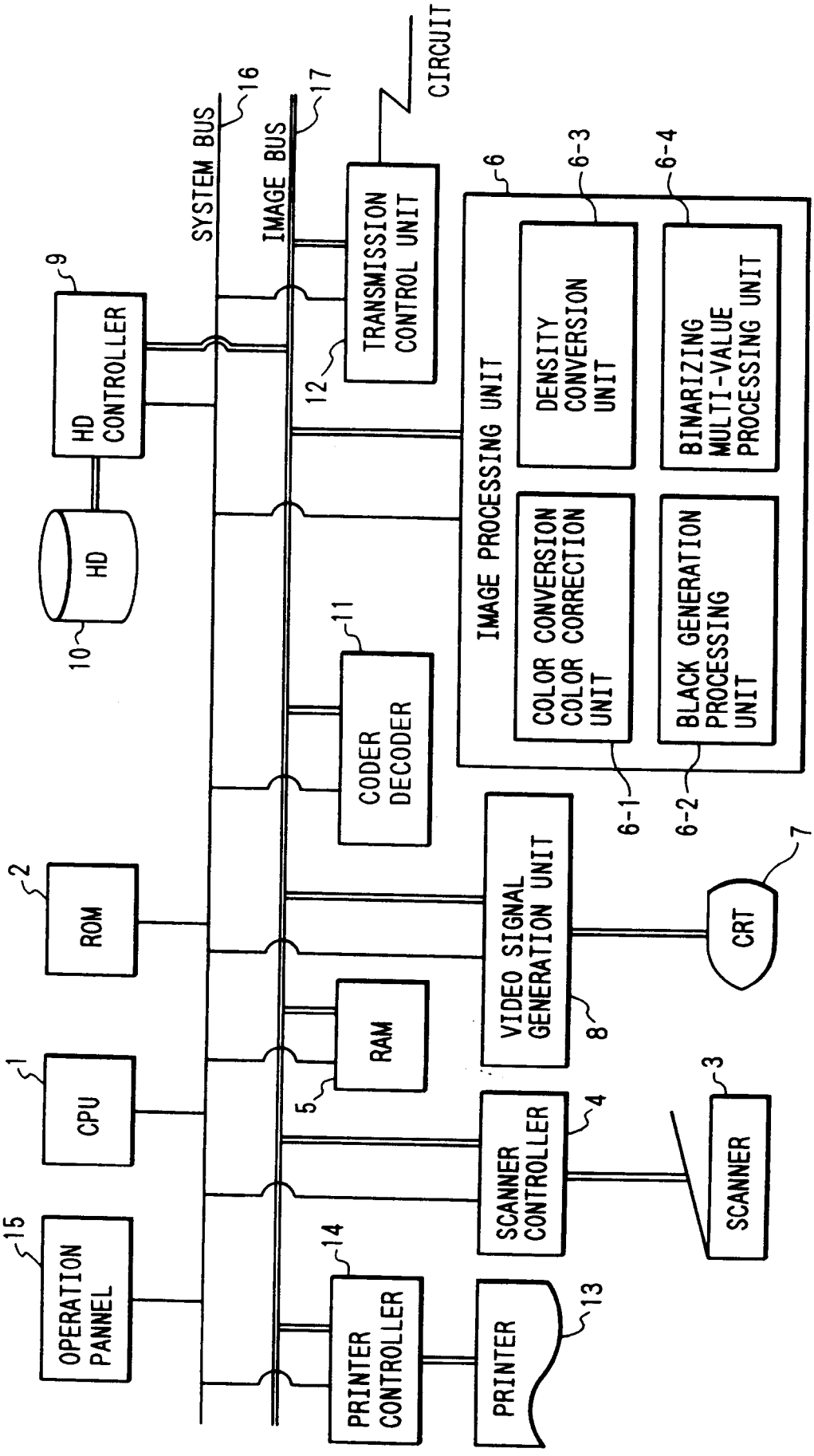
CIRCUIT
SYSTEM BUS
IMAGE BUS
16
17
9
HD CONTROLLER
HD
10
TRANSMISSION CONTROL UNIT
12
6
IMAGE PROCESSING UNIT
6-3
DENSITY CONVERSION UNIT
6-4
BINARIZING MULTI-VALUE PROCESSING UNIT
COLOR CONVERSION COLOR CORRECTION UNIT
6-1
BLACK GENERATION PROCESSING UNIT
6-2
11
CODER DECODER
2
ROM
VIDEO SIGNAL GENERATION UNIT
8
7
CRT
1
CPU
RAM
5
SCANNER CONTROLLER
4
3
SCANNER
15
OPERATION PANNEL
14
PRINTER CONTROLLER
PRINTER
13

FIG. 2

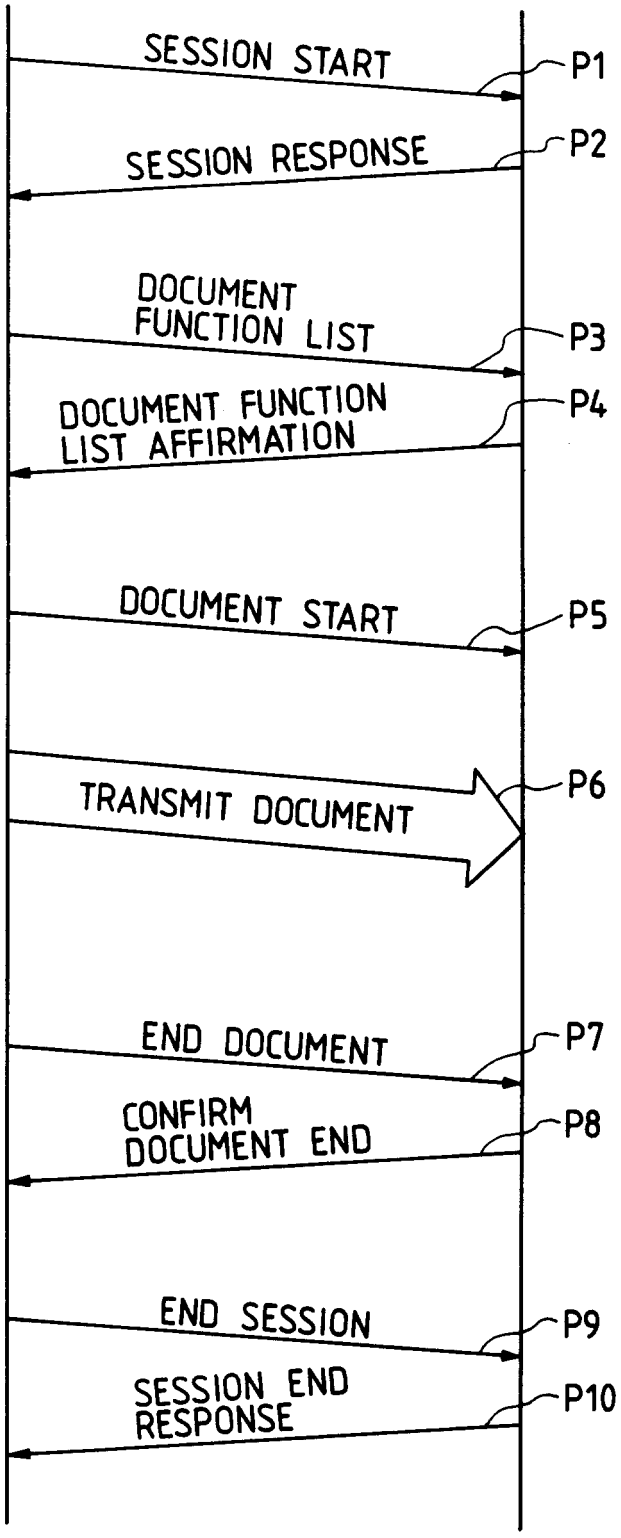
SESSION START
P1
SESSION RESPONSE
P2
DOCUMENT FUNCTION LIST
P3
DOCUMENT FUNCTION LIST AFFIRMATION
P4
DOCUMENT START
P5
TRANSMIT DOCUMENT
P6
END DOCUMENT
P7
CONFIRM DOCUMENT END
P8
END SESSION
P9
SESSION END RESPONSE
P10

FIG. 3

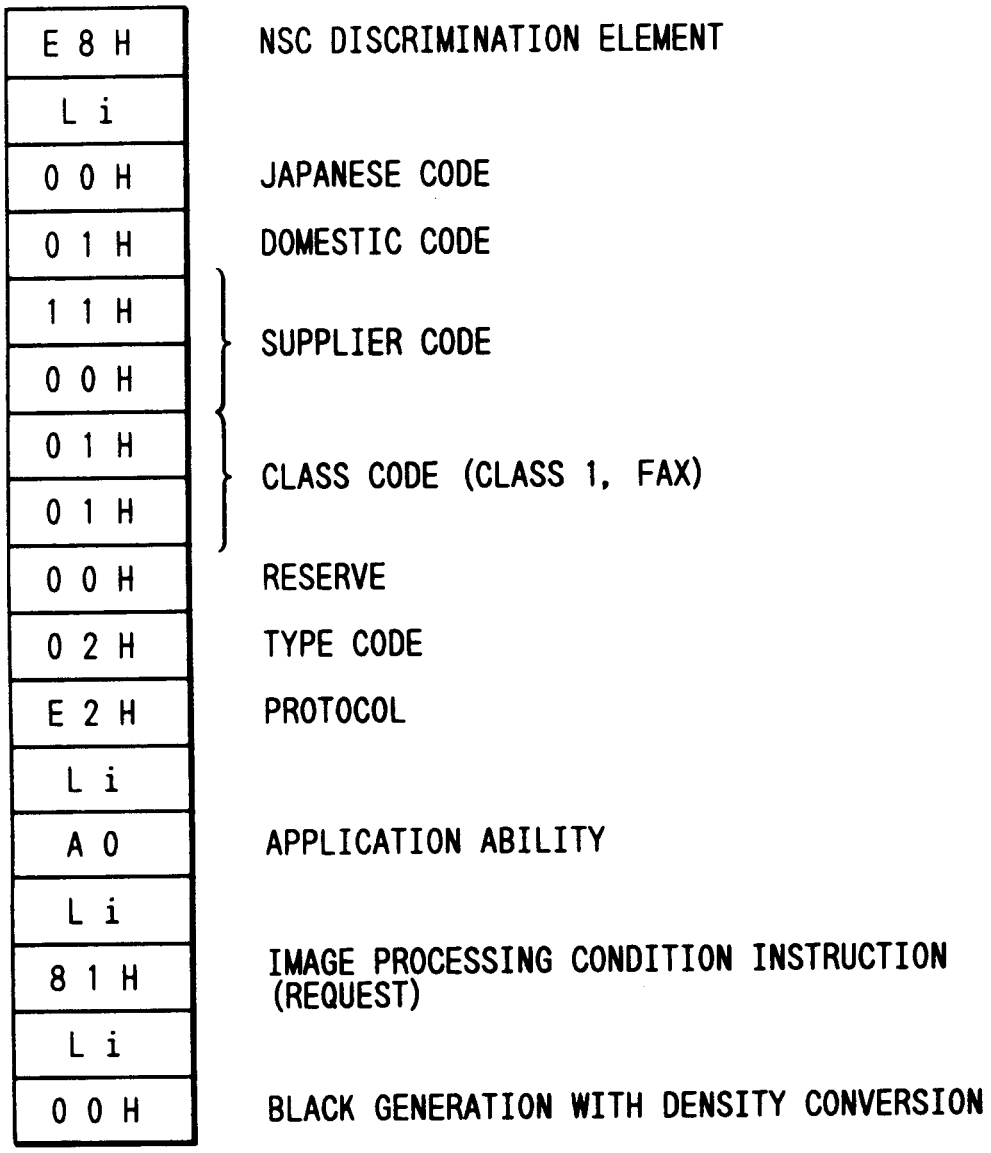
E 8 H
NSC DISCRIMINATION ELEMENT
L i
0 0 H
JAPANESE CODE
0 1 H
DOMESTIC CODE
1 1 H
SUPPLIER CODE
0 0 H
0 1 H
CLASS CODE (CLASS 1, FAX)
0 1 H
0 0 H
RESERVE
0 2 H
TYPE CODE
E 2 H
PROTOCOL
L i
A 0
APPLICATION ABILITY
L i
8 1 H
IMAGE PROCESSING CONDITION INSTRUCTION (REQUEST)
L i
0 0 H
BLACK GENERATION WITH DENSITY CONVERSION

FIG. 4A

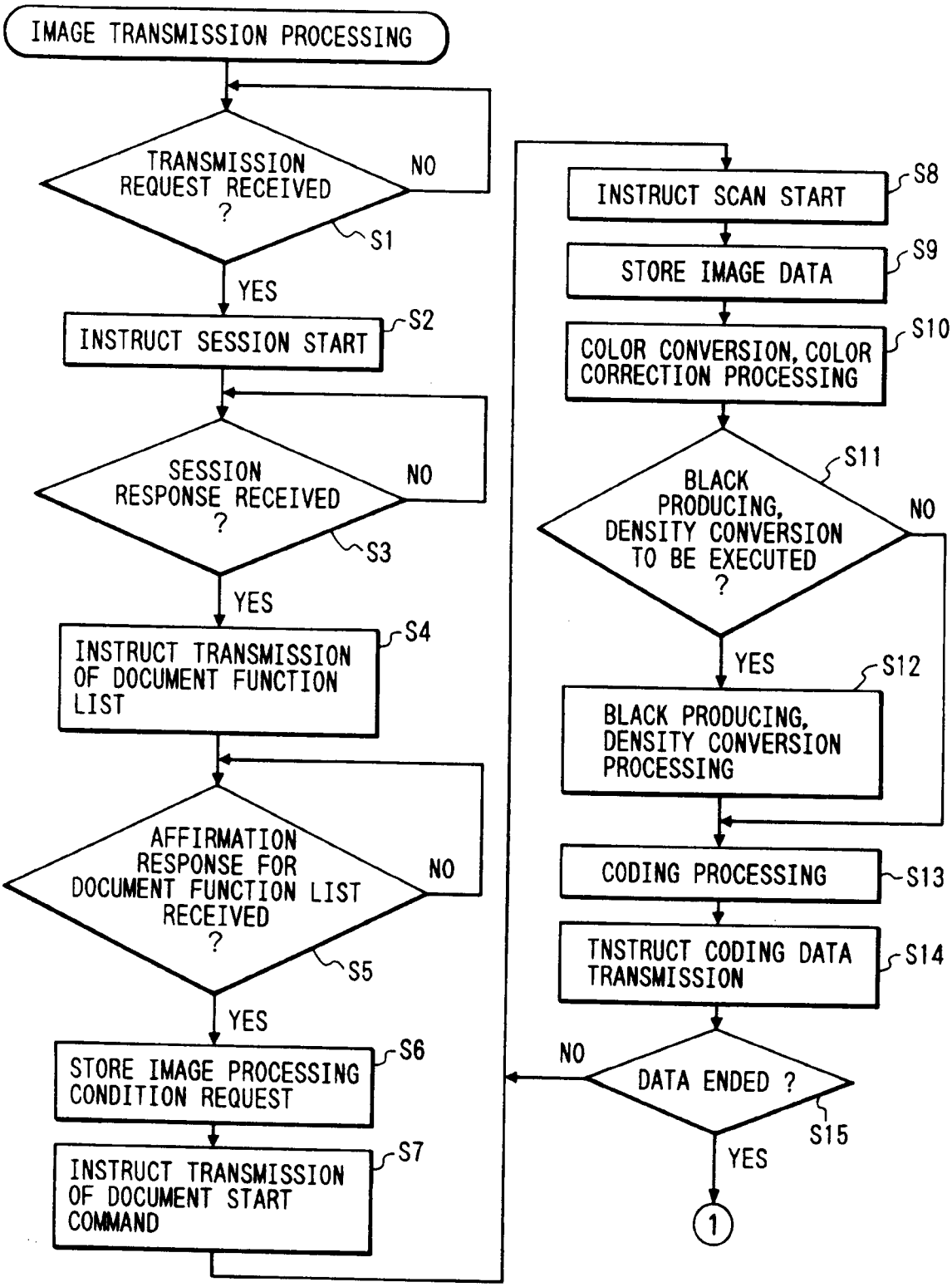
IMAGE TRANSMISSION PROCESSING
TRANSMISSION REQUEST RECEIVED ?
NO
S1
YES
INSTRUCT SESSION START
S2
SESSION RESPONSE RECEIVED ?
NO
S3
YES
INSTRUCT TRANSMISSION OF DOCUMENT FUNCTION LIST
S4
AFFIRMATION RESPONSE FOR DOCUMENT FUNCTION LIST RECEIVED ?
NO
S5
YES
STORE IMAGE PROCESSING CONDITION REQUEST
S6
INSTRUCT TRANSMISSION OF DOCUMENT START COMMAND
S7
INSTRUCT SCAN START
S8
STORE IMAGE DATA
S9
COLOR CONVERSION, COLOR CORRECTION PROCESSING
S10
BLACK PRODUCING, DENSITY CONVERSION TO BE EXECUTED ?
S11
NO
YES
BLACK PRODUCING, DENSITY CONVERSION PROCESSING
S12
CODING PROCESSING
S13
TNSTRUCT CODING DATA TRANSMISSION
S14
NO
DATA ENDED ?
S15
YES
1

FIG. 4B

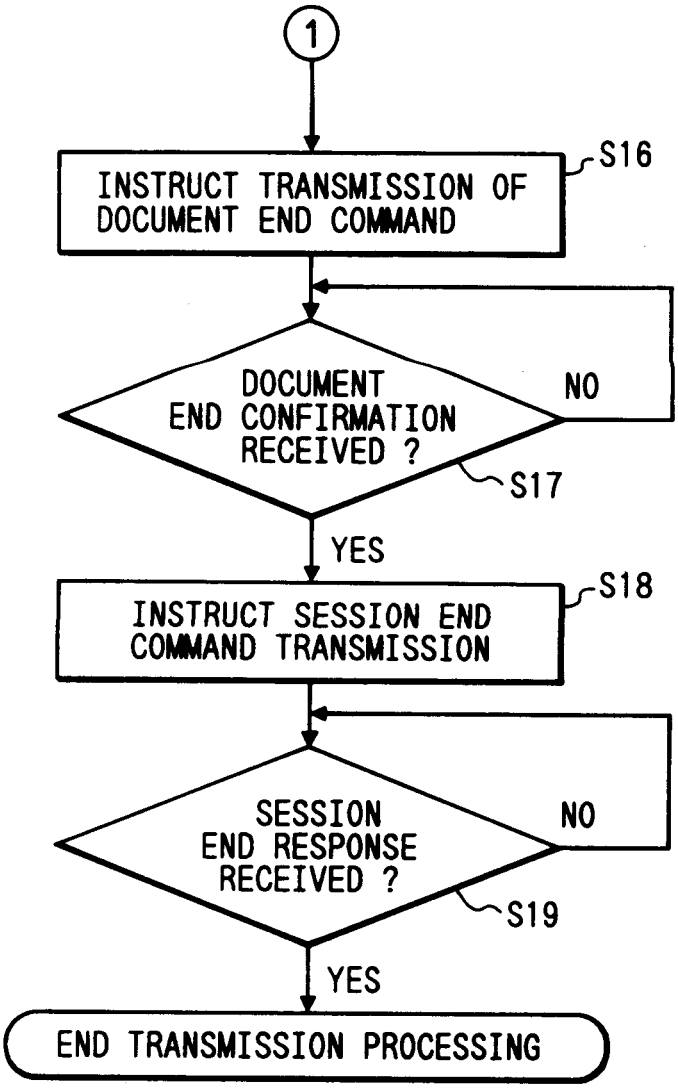
1
INSTRUCT TRANSMISSION OF DOCUMENT END COMMAND
S16
DOCUMENT END CONFIRMATION RECEIVED ?
NO
S17
YES
INSTRUCT SESSION END COMMAND TRANSMISSION
S18
SESSION END RESPONSE RECEIVED ?
NO
S19
YES
END TRANSMISSION PROCESSING

FIG. 5

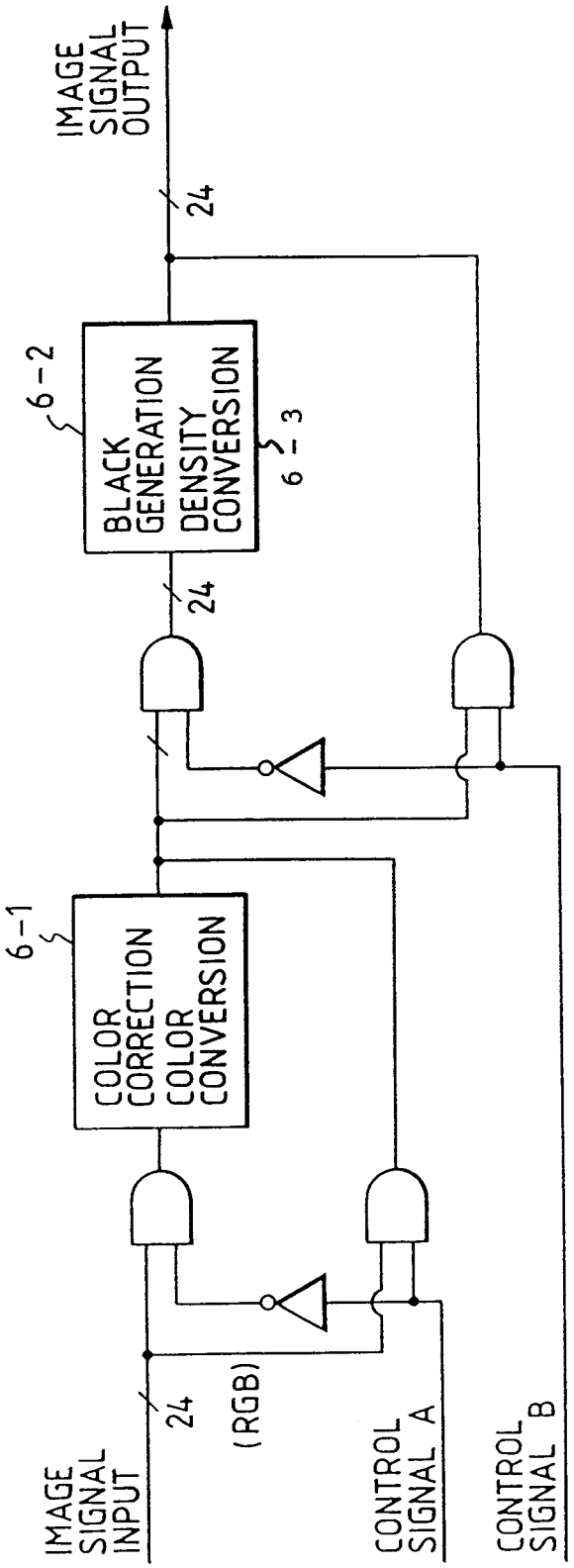
IMAGE SIGNAL OUTPUT
24
6-2
BLACK GENERATION
DENSITY CONVERSION
6-3
24
6-1
COLOR CORRECTION
COLOR CONVERSION
IMAGE SIGNAL INPUT
24
(RGB)
CONTROL SIGNAL A
CONTROL SIGNAL B